

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
22 September 2005 (22.09.2005)

PCT

(10) International Publication Number
WO 2005/088721 A1

(51) International Patent Classification⁷: **H01L 29/737**,
21/331, 21/316, 29/10

(21) International Application Number:
PCT/US2005/008212

(22) International Filing Date: 10 March 2005 (10.03.2005)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/552,308 10 March 2004 (10.03.2004) US

(71) Applicant (for all designated States except US): **AGERE
SYSTEMS INC.** [US/US]; 1110 American Parkway NE,
Allentown, PA 18109 (US).

(72) Inventor; and

(75) Inventor/Applicant (for US only): **GRIGLIONE,
Michelle, Denise** [US/US]; 8600 Oldbridge Lane, Or-
lando, FL 32819 (US).

(74) Agent: **DeANGELIS, John, L., JR.**; Beusse Brownlee
Wolter Mora & Maire, P.A., 390 N. Orange Ave., Suite
2500, Orlando, FL 32801 (US).

(81) Designated States (unless otherwise indicated, for every
kind of national protection available): AE, AG, AL, AM,
AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN,
CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI,
GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE,
KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD,
MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG,
PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ,
TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA,
ZM, ZW.

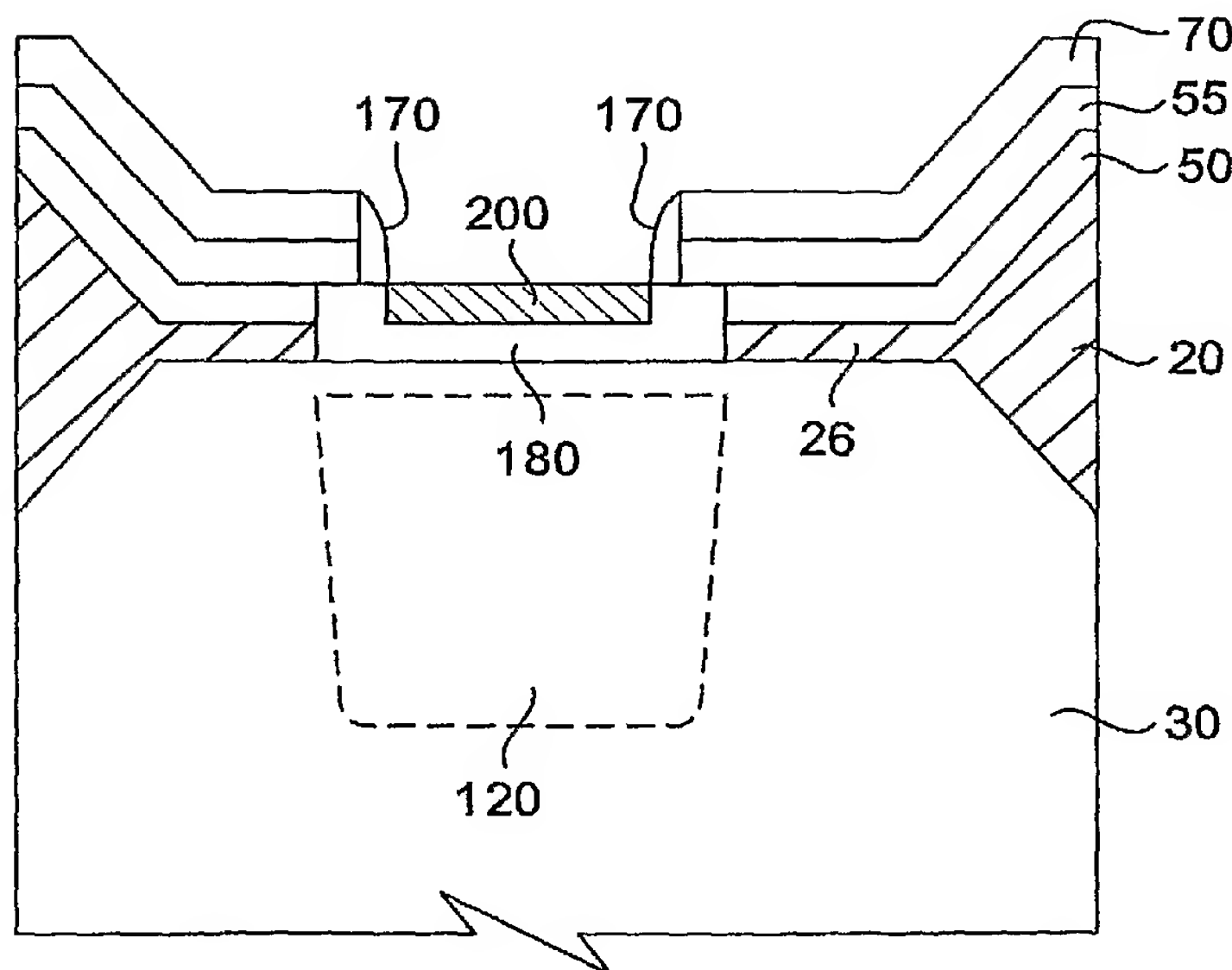
(84) Designated States (unless otherwise indicated, for every
kind of regional protection available): ARIPO (BW, GH,
GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM,
ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),
European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI,
FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO,
SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN,
GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

- with international search report
- before the expiration of the time limit for amending the
claims and to be republished in the event of receipt of
amendments

[Continued on next page]

(54) Title: A BIPOLAR JUNCTION TRANSISTOR HAVING A HIGH GERMANIUM CONCENTRATION IN A SILICON-GERMANIUM LAYER AND A METHOD FOR FORMING THE BIPOLAR JUNCTION TRANSISTOR



(57) Abstract: A method for forming a germanium-enriched region in a heterojunction bipolar transistor and a heterojunction bipolar transistor comprising a germanium-enriched region. A base having a silicon-germanium portion is formed over a collector. Thermal oxidation of the base causes a germanium-enriched region to form on a surface of the silicon-germanium portion subjected to the thermal oxidation. An emitter is formed overlying the germanium-enriched portion region. The germanium-enriched region imparts advantageous operating properties to the heterojunction bipolar transistor, including improved high-frequency/high-speed operation.

WO 2005/088721 A1



For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.